

Message Text

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SUBJECT: TTBT/PNE NEGOTIATIONS - VERBATIM OF FLEMING PRE-
SENTATION DURING OCT 15 PLENARY

1. VERBATIM OF FLEMING PRESENTATION FOLLOWS:

QUOTE: MR. MINISTER, TODAY I WILL TRY TO DESCRIBE TO YOU AND YOUR COLLEAGUES THE FUTURE US PNE PROGRAM AS I VIEW IT. CURRENTLY, THE PRINCIPAL THRUST OF THE US PNE PROGRAM CONSISTS OF FIELD AND LABORATORY WORK LEADING TO A THOROUGH UNDERSTANDING OF THE RIO BLANCO NUCLEAR GAS STIMULATION EXPERIMENT. RIO BLANCO WAS CARRIED OUT IN THE STATE OF COLORADO ON MAY 17, 1973. THREE EPAKT EXPLOSIVES WERE DETONATED SIMULTANEOUSLY IN THE SAME WELL BORE, AT DEPTHS BETWEEN 1780 AND 2040 METERS, IN LOW PERMEABILITY NATURAL GAS FORMATIONS. THE INITIAL RESULTS ARE NOT YET COMPLETELY UNDERSTOOD. WE EXPECT TO CONTINUE STUDYING THIS EXPERIMENT THROUGH THE YEAR 1975. IN ADDITION, LABORATORY STUDIES CONTINUE ON THE APPLICATIONS OF IN-SITU EXTRACTION OF OIL FROM "OIL SHALE," AND IN-SITU CHEMICAL LEACHING OF MINERALS. NO NUCLEAR EXPERIMENTS OF ANY SORT ARE PLANNED DURING THE NEXT 2 YEARS.

THE FUTURE OF THE US PNE PROGRAM IS QUITE UNCERTAIN. WE HAVE AS YET IDENTIFIED NO DOMESTIC NEED FOR NUCLEAR EXCAVATION. THERE ARE SEVERAL CONTAINED APPLICATIONS WHICH COULD BE OF BENEFIT TO THE US ECONOMICALLY, BUT THE ENVIRONMENTAL RISKS

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ATTENDANT TO THESE APPLICATIONS ARE PERCEIVED BY SOME TO

OUTWEIGH THE BENEFITS. MANY OF OUR CITIZENS HAVE A GENUINE FEAR OF OUR USING NUCLEAR EXPLOSIVES, EVEN THOUGH FOR PEACEFUL INDUSTRIAL APPLICATIONS. THIS POSES A VERY SERIOUS AND DIFFICULT PROBLEM WHICH MUST BE SOLVED BEFORE REAL PROGRESS CAN BE ACHIEVED IN ANY PNE APPLICATION IN THE UNITED STATES. THIS PROBLEM APPLIES NOT ONLY TO THE FULL COMMERCIAL PNE DEVELOPMENT OF NATURAL RESOURCES, BUT ALSO THE EXPERIMENTAL WORK REQUIRED IN THE FIELD PRIOR TO COMMERCIAL DEVELOPMENT. THIS THEN HELPS TO EXPLAIN WHY PROGRESS WITH PNES IN THE US HAS BEEN RELATIVELY SLOW IN RECENT YEARS. WE THEREFORE CANNOT SAY WITH ANY ASSURANCE WHAT COURSE OUR FUTURE PROGRAMS WILL TAKE.

HOWEVER, WITH THESE RESERVATIONS IN MIND, I WOULD NOW LIKE TO DISCUSS TWO APPLICATIONS IN THE US WHICH APPEAR ECONOMICALLY ATTRACTIVE AND WHICH WOULD HELP TO ALLEVIATE OUR CURRENT AND PROJECTED SHORTAGES OF OIL AND NATURAL GAS. THESE ARE THE STIMULATION OF NATURAL GAS FLOW FROM LOW PERMEABILITY SANDS, AND THE IN-SITU RECOVERY OF OIL FROM OIL SHALE.

THE EXPERIMENTAL PROGRAM REQUIRED FOR GAS STIMULATION WOULD TAKE PLACE IN THE STATES OF COLORADO, UTAH AND WYOMING. THE NEXT EXPERIMENT IN COLORADO WOULD PROBABLY CONSIST OF 3 OR 4 EXPLOSIVES IN EACH OF 3 TO 5 WELLS. THE DETONATIONS WOULD BE SIMULTANEOUS IN EACH WELL, AS IN RIO BLANCO, AND ALL WELLS WOULD BE STIMULATED ON THE SAME DAY. THIS EXPERIMENT COULD NOT BE CARRIED OUT BEFORE 1977. EXPERIMENTS IN THE OTHER STATES WOULD BEGIN WITH ONLY ONE WELL BEING STIMULATED. AFTER ENOUGH EXPERIMENTAL WORK HAS BEEN ACCOMPLISHED TO ASSESS THE ECONOMIC GAINS AND THE ENVIRONMENTAL CONSIDERATIONS IN ANY GIVEN GAS FIELD, THE DEVELOPMENT OF THE FULL FIELD COULD THEN BE CONSIDERED. WE COULD ENVISION PERHAPS AS MANY AS 35 TO 70 WELL STIMULATIONS PER YEAR IN ANY OF THE THREE STATES. THIS COULD BE ACCOMPLISHED BY EXECUTING 12 TO 15 DETONATIONS ON A SINGLE DAY, THEREBY KEEPING TO A MINIMUM THE NUMBER OF DETONATION DAYS EACH YEAR. EACH EXPLOSION WOULD HAVE A MAXIMUM TOTAL YIELD OF ABOUT 100 KT REGARDLESS OF HOW MANY EXPLOSIVES WERE PLACED IN THE WELL. IN THE EXTREMELY UNLIKELY EVENT OF A FIRM DECISION BEING MADE VERY SOON TO PROCEED WITH SUCH A PROGRAM, WE COULD NOT REACH THESE DETONATION RATES FOR AT LEAST 5 TO 6 YEARS.

TURNING NOW TO THE RECOVERY OF OIL FROM OIL SHALE, I SHOULD
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NOTE THAT THE POTENTIAL AMOUNT OF OIL THAT COULD BE DERIVED FROM OIL SHALE IN THE ROCKY MOUNTAINS IS ENORMOUS. IN THE PICEANCE BASIN MF THE STATE OF COLORADO THERE ARE THOUGHT TO BE DEPOSITS IN EXCESS OF ONE TRILLION (10¹²) BARRELS EXISTING IN AN AREA OF A 20 KILOMETER RADIUS THESE DEPOSITS LIE BETWEEN ABOUT 100 METERS TO 1000 METERS DEEP, AND CONTAIN GRADES UP TO 45 TO 50 GALLONS OF OIL PER TON OF ROCK. THE THICKER DEPOSITS ARE THOUGHT TO BE RECOVERABLE MOST ECONOMICALLY

WITH THE USE OF PNES. THE SCHEME INVOLVES FRACTURING THE ROCK WITH PNES IN ORDER TO CREATE THE REQUIRED PERMEABILITY, FOLLOWED BY RETORTING THE OIL IN PLACE, WITHOUT EVER REMOVING ANY ROCK BY MINING. THE CAPITAL INVESTMENT REQUIRED TO DEVELOP THE FIELD WITH PNES WOULD BE PERHAPS HALF THAT OF CONVENTIONAL MINING FOLLOWED BY RETORTING THE OIL IN SURFACE PLANTS. FURTHERMORE, THE PRICE OF THE OIL WOULD BE \$5 OR LESS PER BARREL USING PNES, COMPARED TO \$10 OR MORE PER BARREL USING SURFACE RETORTING METHODS.

WE IN THE US, JUST AS YOU IN THE USSR, HAVE BECOME INCREASINGLY CONCERNED ABOUT DEGRADATION OF THE ENVIRONMENT CAUSED BY INDUSTRIAL PROCESS. THE USE OF PNES TO RECOVER OIL FROM SHALE APPEARS TO OFFER MANY SIGNIFICANT ENVIRONMENTAL ADVANTAGES OVER CONVENTIONAL METHODS OF MINING AND SURFACE RETORTING. FOR EXAMPLE, IN ORDER TO RECOVER 1 MILLION BARRELS PER DAY OF OIL USING STRIP MINING METHODS, IT WOULD BE NECESSARY TO DISPOSE OF 1 1/2 BILLION (109) TONS OF SPOIL PER YEAR, WHEREAS USING PNES REQUIRES NO SPOIL DISPOSAL AT ALL. AS A COMPARISON, THE ENTIRE US COAL INDUSTRY MINES ANNUALLY ONLY 40 PERCENT OF THAT AMOUNT, OR 600 MILLION TONS. WATER REQUIREMENTS WOULD BE VERY MUCH LESS IF PNES ARE USED. THIS IS AN IMPORTANT ADVANTAGE BECAUSE THE REGION IS SEMI-ARID WITH OTHER LARGE DEMANDS FOR LOCAL WATER SUPPLIES.

ONE DISADVANTAGE OF THE PNE METHOD IS THAT MINOR DAMAGE TO LOCAL BUILDINGS IS CAUSED BY SEISMIC MOTION. IN THE SPARSELY SETTLED PICEANCE BASIN, THIS IS A MINOR PROBLEM. ANOTHER DISADVANTAGE IS THE RADIOACTIVITY WHICH WOULD APPEAR IN THE OIL. OUR CALCULATIONS INDICATE THAT RADIATION EXPOSURES FROM THE USE OF THIS OIL WOULD BE VERY SMALL. FOR EXAMPLE, IF ALL THE GASOLINE FOR AUTOMOBILES IN THE LOS ANGELES BASIN WERE PRODUCED SOLELY FROM SHALE OIL USING PNES, WE ESTIMATE THE ANNUAL EXPOSURE WOULD BE ABOUT ONE-TENTH OF THAT RECEIVED FROM NORMAL VIEWING COLOR TELEVISION.

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IT SHOULD BE EMPHASIZED THAT SOME OF THESE ESTIMATES ARE BASED ON EXTRAPOLATIONS FROM EXPERIENCE IN ROCK OTHER THAN OIL SHALE ROCK, AND A LIMITED EXPERIMENTAL EFFORT WITH LABORATORY RETORTS. WE HAVE NEVER ACTUALLY DETONATED A NUCLEAR EXPLOSIVE IN OIL SHALE. THEREFORE SOME OF THESE ESTIMATES MAY BE INCORRECT, AND CAN BE CONFIRMED ONLY BY FULL SCALE EXPERIMENTS IN THE FIELD.

THE FIRST FIELD EXPERIMENT WOULD USE A SINGLE NUCLEAR EXPLOSIVE, PROBABLY IN THE 20 TO 50 KT RANGE, AND COULD NOT BE DETONATED BEFORE ABOUT 1978. IT WOULD BE A DIFFICULT EXPERIMENT BECAUSE OF POTENTIAL PROBLEMS WITH OVERLYING AQUIFERS AND BECAUSE THE OIL SHALE IS RICH IN CARBONATE, REQUIRING CARE TO ASSURE CONTAINMENT. A SERIES OF EXPERIMENTS WOULD BE REQUIRED BEFORE PROCEEDING WITH FIELD DEVELOPMENT. WE CAN ENVISAGE ULTIMATELY ABOUT 50 TO 100

WELLS PER YEAR, BUT THAT RATE COULD NOT BE ACHIEVED UNTIL PROBABLY THE MID-1980'S. THE EXPLOSIVE YIELDS WOULD BE NO LARGER THAN ABOUT 100 KT.

IN SUMMARY, I HAVE TRIED TO DESCRIBE TO YOU THE SCOPE OF THE FUTURE US PROGRAM, PROVIDED THE DIFFICULTIES MENTIONED CAN BE OVERCOME. WE FORESEE NO APPLICATION FOR EXCAVATION WITHIN THE TERRITORY OF THE UNITED STATES. FOR CONTAINED APPLICATIONS, WE WILL REQUIRE EXPLOSIONS NO GREATER THAN ABOUT 100 KT. YOU CAN SEE THAT THE US PNE PROGRAM WILL CONTINUE TO BE SMALLER IN SCOPE THAN THE SOVIET PROGRAM FOR SOME TIME TO COME. THE DEGREE OF PROGRESS WILL DEPEND IN PART ON THE PERCEPTIONS OF MANY OF OUR CITIZENS ABOUT THE POTENTIAL ECONOMIC AND ENVIRONMENTAL BENEFITS COMPARED WITH THE DISADVANTAGES.

THANK YOU, MR. MINISTER.

END QUOTE.

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